

Screening for hazardous drinking

Using the CAGE and measures of alcohol consumption in family practice

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OBJECTIVE To determine the drinking practices of a family practice population, to examine the CAGE and questions about drinking as a method of screening for hazardous alcohol use, and to examine the relationship between alcohol consumption and CAGE items, particularly in a subgroup of hazardous drinkers.

DESIGN Random survey of patients representative of a clinic population.

SETTING Family practice clinic.

PATIENTS Of 1420 patients approached while waiting to see a family physician for medical reasons, 1376 agreed to participate; 1334 turned in usable questionnaires.

MAIN OUTCOME MEASURES Drinking measures and CAGE items; CAGE questions and levels of alcohol use were used to determine current drinking practices. A subgroup of hazardous drinkers was examined in greater detail.

RESULTS Forty percent of male patients and 11% of female patients reported at least one "hazardous" drinking (four or more drinks) day in the past month. Answering yes to CAGE items was more specific to drinking for male subjects, who also reported a greater number of maximum drinks with a CAGE score of 2 or more.

CONCLUSIONS This brief questionnaire was a feasible tool for identifying family practice patients who could be at risk for developing alcohol problems. All patients could be invited to complete the questionnaire while waiting for their appointments.

OBJECTIF Déterminer les habitudes de consommation dans une population de pratique familiale, analyser le questionnaire CAGE et autres questions touchant la consommation comme méthode de dépistage de la consommation à risque et examiner le lien entre la consommation d'alcool et les questions CAGE, particulièrement dans un sous-groupe de consommateurs en danger.

CONCEPTION Enquête auprès d'un échantillon aléatoire de patients représentatifs de la population d'une clinique.

CONTEXTE Clinique de médecine familiale.

PATIENTS Des 1 420 patients approchés pendant qu'ils attendaient de voir un médecin de famille pour des raisons médicales, 1 376 ont accepté de participer, ce qui a permis de recueillir 1 334 questionnaires utilisables.

PRINCIPALES MESURES DES RÉSULTATS Mesures de la consommation et items du questionnaire CAGE; utilisation des questions CAGE et des niveaux de consommation pour préciser les habitudes de consommation. Un sous-groupe de consommateurs en danger a fait l'objet d'une analyse détaillée.

RÉSULTATS Quarante pourcent des patients et 11% des patientes ont rapporté qu'au cours du dernier mois ils avaient connu au moins une journée de consommation «à risque» (au moins quatre consommations). Le fait de répondre oui à l'un des items du questionnaire CAGE s'est avéré plus spécifique de la consommation pour les sujets de sexe masculin chez qui on a constaté une augmentation significative des journées de consommation maximale et du nombre maximum de consommations lorsque le résultat au CAGE était d'au moins deux réponses positives.

CONCLUSIONS Ce bref questionnaire s'avère un outil pratique pour identifier les patients d'une clinique familiale qui sont à risque de développer des problèmes d'alcool. On devrait inviter tous les patients à compléter le questionnaire pendant qu'ils sont en attente de leur rendez-vous.

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PEOPLE WITH ALCOHOL-RELATED problems use health care services more frequently than the general population.¹⁻⁵ About 15% of family practice patients consume harmful amounts of alcohol.⁶ When a patient attends a clinic, alcohol-related problems sometimes are not initially recognized as a consequence of hazardous alcohol consumption.

General practitioners are being increasingly urged to more actively identify and prevent alcohol problems. They are in a good position to detect early signs of alcohol abuse and to intervene with brief advice without making special demands on their time or resources.⁷⁻⁹ Practitioners are often reluctant to question patients who are attending the clinic for other health problems about alcohol consumption. Using a brief questionnaire as a routine inquiry about alcohol use and related symptoms might assist physicians and alert patients to the risk of developing more serious problems as a consequence of drinking.

Consuming 15 or more alcoholic drinks weekly is thought to represent moderate risk for developing alcohol problems.¹⁰ Sanchez-Craig¹¹ has determined that more than 12 drinks weekly can cause problems, particularly if drinking exceeds four drinks daily. Drinking above this level provides a physician with sufficient reason to discuss a patient's use of alcohol in more detail.

The most widely used screening instruments for patient self-report of symptoms associated with alcohol use are the four-item CAGE questionnaire developed by Ewing and Rouse¹² and the 25-item Michigan alcohol screening test (MAST).¹³ Because of its brevity, the CAGE is preferred. It has been validated in psychiatric, medical,¹⁴⁻¹⁶ and general practice populations.¹⁷⁻¹⁹

Two or more affirmative answers to the CAGE have better diagnostic sensitivity (around 90%) among heavy drinkers than the use of laboratory markers or physician identification

through clinical signs.^{18,20} However, in general populations, answering yes to CAGE items does not necessarily correspond with current daily use, but is more indicative of those who drink heavily (five or more drinks) and regularly (at least once weekly).²¹ Smart and associates²¹ found the four CAGE items to measure a single dimension of problem drinking, and the items have good internal reliability.

The CAGE tends to identify heavier drinkers, and the questions relate to a 12-month period, rather than present use. In our study, therefore, both self-report of problems associated with alcohol (ie, CAGE) and current drinking patterns were used to ensure that the questionnaire was both sensitive and specific, so that all patients potentially at risk of hazardous alcohol consumption were included.

This report is the first part of a larger study designed to assess the relative effectiveness of brief interventions for reducing alcohol use. For this first part, we had three objectives: to determine the drinking practices of the clinic population, to examine the present questionnaire as a method of screening for hazardous alcohol use, and to examine the relationship between alcohol consumption and CAGE items, particularly in a subgroup of hazardous drinkers. In this study, hazardous drinking was defined as the consumption of four or more drinks on any 1 day within the reported 28-day period, or answering yes to one or more CAGE items.

METHOD

Subjects

Over 11 consecutive months (during 1991-1992), 1420 patients were approached while waiting for appointments with their family physicians; 1376 patients agreed to answer the brief questionnaire. Forty-two questionnaires were excluded because the patient's sex was not identified. The sample therefore consisted of

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1334 patients (1015 female patients and 319 male patients). There were more women than men in the sample because women tend to visit the clinic more frequently for regular checkups. The average age was 42 for male subjects (range 15 to 87 years) and 40 for female subjects (range 15 to 90 years). The patients were representative of the sex and age distribution of the total practice.

Table 1. Respondents reporting moderate (one to three drinks) or hazardous (four or more drinks) drinking on at least one day during the previous 28 days

PATIENT GROUPS	MALE (N = 319)	FEMALE (N = 1015)
Patients reporting at least 1 day of moderate drinking	169 (53%)	472 (46%)
Mean no. of days of moderate drinking	8.56	4.33
Patients reporting at least 1 day of hazardous drinking	128 (40%)	112 (11%)
Mean no. of days of hazardous drinking	7.3	4.7
Mean no. of drinks on a day of hazardous drinking	9.6	7.5
Mean no. of maximum drinks on a day of hazardous drinking	11.56	8.13

Instrument

A brief questionnaire was used to determine personal information, answers to the four CAGE items, and information on alcohol consumption.

Personal information. We asked the patient's first name, telephone number, age, and sex.

Four CAGE items. We asked whether, during the past 12 months, patients had ever felt that they should Cut down on their drinking, had been Annoyed by people criticizing their drinking, had ever felt bad or Guilty about their drinking, and had ever had a drink first thing in the morning to steady their nerves or get rid of a hangover (Eyeopener).

Alcohol consumption. Patients were asked to describe their drinking within the past 28 days. One drink was defined as 1.5 oz of spirits, 3 oz of fortified wine, 5 oz of table wine, or 12 oz of regular beer (each equivalent to 13.6 g of alcohol).

- On how many days did you *not* have any alcoholic beverages?
- On how many days did you have *one or two* drinks?
- On how many days did you have *three* drinks?
- On how many days did you have *four or more* drinks?
- On the days when you had four or more drinks, how many drinks did you *usually* have?
- What was the *maximum number* of drinks you had in one day?
- On *how many days* did you drink the maximum number in the above question?

Procedure

Twelve physicians (six male, six female) at a family practice centre in Sydney, NS, agreed to have their patients screened on a weekly rotating schedule. On arrival, every patient 15 years and older was approached by the attending nurse, who invited him or her to participate in a health promotion project by answering a brief questionnaire. Patients completed the questionnaire in private and returned it to the nurse.

Design and analyses

The sample was grouped according to sex. Group differences were estimated by χ^2 , *t* tests, and multivariate analysis of variance (MANOVA) using the Statistical Package for the Social Sciences (version 4.0 PC), as appropriate. Probability level of at least $P < .05$ was used to estimate significance.

RESULTS

Drinking practices

There were 111 (35%) male respondents and 504 (50%) female respondents

who reported no drinking during the previous 28 days. A χ^2 test confirmed that significantly ($P < .01$) fewer male patients were abstainers.

Table 1 shows the number of patients who reported at least 1 day of moderate drinking (one to three standard drinks) and who reported at least 1 day of hazardous drinking (four or more drinks). These two categories are not mutually exclusive, because a patient might report both days of moderate drinking and days of hazardous drinking during the 28-day period. The percentage of male and female patients who reported at least one moderate drinking day was similar (46% and 53%), but male respondents on average reported drinking moderately twice as often.

Male patients were 3.5 times more likely to report days of hazardous drinking (40% versus 11%) than female patients. Using t tests, and including only those who reported at least one hazardous day, significant differences between the sexes were observed on all measures:

- days drinking (male respondents reported more frequent drinking);
- maximum drinks (male patients had three more drinks on average); and

- days of maximum drinks (male respondents drank more frequently at their maximum level).

All t tests were significant beyond $P < .001$.

Identifying hazardous drinkers with the questionnaire

The questionnaire appeared to be acceptable to most patients when it was explained as a health promotion concept: 97% of patients who were approached agreed to complete it. The questionnaire took approximately 5 to 10 minutes to complete, while patients were waiting to see their physicians. A few patients enquired of their physicians as to the purpose, but were nevertheless willing to complete it.

The attending nurses reported few problems in having the questionnaire completed. A small proportion of patients (about 5%) had difficulty calculating the total number of days of drinking and asked the nurse for assistance.

In general there were few complications or objections to completing this questionnaire. The 44 patients who refused were either too ill, were distracted by their children, or excused themselves by not having

Table 2. Proportion of patients, rated by their CAGE scores, reporting at least 1 day during which they drank four or more drinks

TOTAL CAGE SCORE (NO. OF QUESTIONS ANSWERED YES)	MALE RESPONDENTS		FEMALE RESPONDENTS	
	NO. (N = 319)*	NO. REPORTING FOUR OR MORE DRINKS DAILY	NO. (N = 1015)†	NO. REPORTING FOUR OR MORE DRINKS DAILY
0	218	64 (29.4%)	888	81 (9.1%)
1	41	28 (68.3%)	36	16 (44.4%)
2	18	15 (83.3%)	25	9 (36.0%)
3	17	17 (100.0%)	9	6 (66.7%)
4	13	10 (76.9%)	3	3 (100.0%)

*12 cases missing. †54 cases missing.

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their glasses with them. One person was unable to read.

Identifying hazardous drinkers with CAGE

We defined hazardous drinking as the consumption of four or more drinks on any 1 day within the reported 28-day period or answering yes to one or more CAGE items.

Table 2 shows how patients reporting at least 1 day of hazardous drinking answered CAGE questions. Of these, almost 30% of male and 9% of female respondents reported at least 1 day of hazardous drinking without answering yes to a CAGE item. Subtracting the number of respondents who drank four or more drinks on any one day from the total number of respondents for each separate CAGE score shows that 19 of 89 male patients (21%) and 39 of 73 (53%) female patients answered yes to one or more CAGE items without reporting a day of hazardous drinking.

Table 3 shows the relative sensitivity of drinking days to CAGE items. For both male and female respondents, the rank order was: Cut down, Guilty, Annoyed, Eyeopener. Overall, male respondents were four times more likely than female respondents to answer yes to a CAGE item.

Answering yes to a CAGE item was more specific to drinking for male than for female patients. Student's *t* tests were used to compare differences in number of drinking days for male and female respondents separately by their positive response to each CAGE item. Among male patients, the number of days of hazardous drinking was significantly higher for those who answered yes to each CAGE item compared with those who did not. There was no difference in the number of days of hazardous drinking for female patients. The *t* tests, with levels of significance based on tests of homogeneity of variance, were all significant for male

Table 3. Days of drinking reported by male and female respondents versus responses to each CAGE item: Totals reflect moderate and hazardous drinkers only.

CAGE ITEMS	MALE RESPONDENTS (N = 199)		FEMALE RESPONDENTS (N = 494)	
	N (%)	MEAN ± SD	N (%)	MEAN ± SD
CAGE QUESTION 1: CUT DOWN				
Yes	65 (33)	7.8 ± 12.6*	46 (9)	2.2 ± 7.2
No	134 (67)	2.5 ± 7.9	448 (91)	0.9 ± 2.9
CAGE QUESTION 2: ANNOYED				
Yes	23 (12)	9.9 ± 8.9*	14 (3)	2.4 ± 3.5
No	176 (88)	3.5 ± 9.9	480 (97)	1.0 ± 7.0
CAGE QUESTION 3: GUILTY				
Yes	34 (17)	11.5 ± 16.1*	30 (6)	1.8 ± 2.7
No	166 (83)	2.7 ± 7.4	464 (94)	1.0 ± 7.1
CAGE QUESTION 4: EYEOPENER				
Yes	21 (11) [†]	16.3 ± 18.7*	5 (1)	6.3 ± 6.2
No	179 (90) [†]	2.8 ± 7.3	489 (99)	1.0 ± 7.0

**P* < .005 using independent Student's *t* tests. [†] Percentages total more than 100% because of rounding.

respondents at $P < .005$. (To reduce the probability of type I error, only P values $< .01$ are reported.) Also, women drank less frequently and less heavily than men.

CAGE scores

A MANOVA was conducted with the total sample to determine whether patients with a CAGE score of 0 differed significantly from patients answering yes to one item or two or more items. Three dependent measures (total days drinking, days drinking at a maximum level, drinks on a maximum day) and two grouping factors (sex and CAGE) were included in the analysis. The MANOVA showed a significant sex difference ($f [4] = 30.86$, $P < .001$), CAGE ($f [8] = 27.53$, $P < .001$), and a sex-CAGE interaction ($f [8] = 6.134$, $P < .001$) across all three dependent measures ($P < .001$).

The interaction implies that the patterns of the three drinking measures differed significantly between male and

female respondents for the different CAGE scores. In comparing the means on the dependent measures (Table 4), the difference is accounted for mostly by the fact that female patients did not show such a large increase in consumption between CAGE scores of 1 and 2 or more, compared with male patients.

DISCUSSION

Our study showed that screening for alcohol abuse in family practice is feasible. We found that the CAGE questionnaire combined with a few questions on alcohol use was acceptable to our patients. Of the 1420 patients approached, 97% willingly answered our questionnaire while they waited to see their physicians.

Our data show that male patients drink more and drink more frequently than female patients. However, it is important to emphasize that, because

Table 4. CAGE scores and measures of drinking during previous 28 days

CAGE SCORE (NO. OF QUESTIONS ANSWERED YES)	TOTAL DAYS OF DRINKING MEAN \pm SD	DAYS OF MAXIMUM DRINKS MEAN \pm SD	MAXIMUM DRINKS MEAN \pm SD
0			
Male respondents (N = 218)	3.8 \pm 7.4	1.0 \pm 6.0	2.7 \pm 7.1
Female respondents (N = 888)	1.9 \pm 5.6	0.4 \pm 5.1	0.7 \pm 5.3
1			
Male respondents (N = 41)	8.9 \pm 7.1	1.8 \pm 1.9	5.2 \pm 4.6
Female respondents (N = 36)	4.9 \pm 4.6	0.7 \pm 0.9	2.8 \pm 3.3
2 OR MORE			
Male respondents (N = 48)	11.4 \pm 14.3	6.3 \pm 14.0	12.0 \pm 14.5
Female respondents (N = 37)	3.9 \pm 4.8	1.6 \pm 2.7	3.7 \pm 4.7

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female patients for many different reasons visit their physicians more frequently, the overall effect of screening is to reach as many female as male patients who are drinking at hazardous levels.

The most frequent positive response to a CAGE item (in *Table 3*) for males and females was the first. Approximately one third of male drinkers answered yes to this item, a finding similar to both Smart et al²¹ and Murrelle et al,²² who reported on general population samples. The eye-opener item (question 4) was much more frequently answered yes by male respondents than by female respondents and was related to the reports of heaviest drinking by both sexes. According to Murrelle and colleagues,²² this item is associated with suicide attempts and accidents.

As patients answered yes to more CAGE items, their proportion of days of hazardous drinking to total days of drinking increased, indicating greater overall consumption. This finding supports the contention by Buchsbaum et al²³ that CAGE scores enable physicians to consider patients along a continuum of risk for abuse or dependence. Men dramatically increased their maximum drinks and days of maximum drinking, especially when answering yes to two or more CAGE questions. The increase from CAGE scores of 1 to 2 or more for female respondents was less marked.

We calculated from *Table 2* that 19 of 89 male and 39 of 73 female respondents answered yes to one or more CAGE items but did not report a current day of hazardous drinking. The most likely explanation for this is that CAGE items are formulated as "In the past 12 months, have you...", indicating previous experience with alcohol, and not necessarily within the last month. This could indicate that these patients have recognized they have experienced problems with alcohol use and have taken measures to correct it. However, a single positive answer to a CAGE item could also

refer to the desire to avoid the caloric content of alcoholic beverages, rather than problems associated with drinking. Conversely, 64 of 218 male and 81 of 888 female respondents reported hazardous drinking without responding positively to a CAGE item. This is an important group to target clinically because they possibly have not yet recognized that their drinking could cause problems.

CONCLUSION

Both CAGE items and current consumption measures were combined in a brief 5-minute questionnaire that was easily completed while patients waited to see their physicians. As a screening instrument, the CAGE indicated the patients' awareness of the effect of their drinking on both themselves and others, while consumption measures provided a way of determining whether patients were currently drinking hazardously. It is, therefore, practical to include both the CAGE and recent consumption measures for screening. Given the brevity of the questionnaire, all patients could be invited to complete it while waiting for their appointments. ■

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